

Does Inflation has an Effect on Economic Growth? Empirical Evidence from Pakistan

Raima Nazar¹, Aisha Ambreen², Sumbal Sabtain³

Abstract

Pakistan is one of the developing countries instead of possessing a large number of natural resources like mines, reserves of coal, an adequate amount of minerals and oil, But, Pakistan is still deprived of necessities of life and suffering from extreme inflation in the country. Therefore, this study is an attempt to synopsis the impact of inflation on the GDP of Pakistan. This study mainly focuses on the inflation rate from the period 1980 to 2016, time series annual data has been employed in the study. The Auto Regressive Distributed Lag Model technique is applied in the study to estimate and analyze the data. The study concludes that inflation indicates a negative impact on the GDP of Pakistan and it can only be minimized if all resources of the country are properly allocated and fully utilized.

Keywords: Inflation, Gross Domestic Product, Trade Openness, Literacy rate, Gross Capital Formation.

1. Introduction

Pakistan has been fortunately blessed with a large number of natural resources but still despite all this fortunate Pakistan is still one of the developing countries. Pakistan has been suffering from a large number of social and economic problems like a bribe, terrorism, robbery, target killing, unemployment and poverty. These factors directly influence the economy of the country and as result inflation starts rising (Ali et al., 2012; Mudassar et al., 2013; Sarwar et al., 2013; Ali et al., 2020 a,b). On the other hand, there were still some countries that comprise same problems but due to good policies and government efforts their economy is stable. This phenomenon leads the researcher to investigate the effect and relationships between inflation and economic growth. In many developing countries of the world, the main target of the macroeconomic policies by the government is to stabilize the prices of goods and commodities along with an increase in the economic growth of the country as well (Zahoor et al., 2013; Fakher et al., 2014). In the case of Pakistan, the State Bank of Pakistan is taking such measures as contractionary and expansionary monetary policies to cope with the problem of inflation and low economic growth. A large proportion of the population of Pakistan is surviving with the problem of inflation every year. Inflation or long term price hike may be defined as a

¹ Lecturer, Department of Economics, The Women University, Multan, Pakistan, raima.6343@wum.edu.pk

² Assistant Professor, Department of Economics, The Women University, Multan, Pakistan, ambreen67k@gmail.com

³ Undergraduate Scholar, Department of Economics, The Women University, Multan, Pakistan, sumbalsabtain@gmail.com

situation where the prices of goods, services and commodities continue to increase for a long period (Faridi et al., 2015; Ali and Nazar, 2017). This increase may lead to a decrease in the purchasing power of the consumers. Moreover, due to inflation, a large proportion of the consumer's income is spent on daily based needs. This results in a fall in saving and investment, respectively. One of the reasons for inflation is also the increase of the money supply in the economy.

A wider range of studies has been available on inflation and growth which describes the importance and role of inflation in different ways (Nazar et al., 2018; Faheem et al., 2019; Chaudhry et al., 2019, 2020). These studies applied different data, variables, theories, different periods, test statistics, analysis and techniques. Hence these studies conclude different results based on their methodology. But still, there is a need to improve the results and conclusions. This study is also an effort to fill the space that has been observed in the previous studies. For this purpose, the research has been carried out on the data of Pakistan from the period 1985 to 2016 for about 36 years. Different variables had been taken like trade openness, literacy rate, consumer price index gross capital formation and gross domestic product. Auto Regressive Distributed Lag model technique had been applied on the data set. Moreover, the policies and recommendations were also quite different from the past ones and prove to be beneficial for the economy.

The objectives of the study are the main base of any kind of research as the whole study is based on this phenomenon. The main objective of this study is to check the impact of inflation on GDP using the time series data. Secondly, to examine the impact of Consumer Price Index, Trade Openness, Literacy rate and Gross Capital Formation on GDP. Thirdly, to examine which policies are useful for economic growth whether monetary or fiscal. Fourthly, to give some policy related recommendations to control the price hike.

2. Literature Review

A large amount of research has been carried out on inflation and GDP. Barro (1995) analyzed the association between inflation and economic growth. Panel data were used in the study to carry out the research. Data was taken from about 100 countries worldwide from the period 1960 to 1990. The main growth determinants variables employed in the study by the researcher were Gross Domestic Product, Terms of Trade and investment rate. Moreover, inflation was used as a dependent variable in the study. The study concluded that inflation had a negative and significant effect on economic growth. Malla (1997) assessed the impact of inflation on economic growth by taking the data of 11 OECD as well as Asian countries. Many variables have been employed in the study like GDP per capita, GDP growth rate, CPI, trade openness, terms of trade and population growth rate. Panel analysis data was applied for the estimation of data. The study concluded that in the case of OECD countries there is no linkage between inflation and economic growth. But in the case of Asian countries, there is a significant negative bonding between inflation and economic growth.

Bruno and Easterly (1998) assessed the long term association between inflation and economic growth. The researcher employed the data from the period 1961 to 1992 of about 26 developed and developing countries. Main variables like Inflation, investment rate and Growth rate were used in the study. The study concludes that both high rates of inflation, as well as low rate of inflation, are provoked less supportable for economic growth. So the researchers specified a certain limit of 40 percent beyond or above which the inflation

shows negative and hazardous effects on the economic growth of the nation. Glyfason and Herbertson (2001) analyzed the effect of inflation on economic growth by taking the data of 170 developed and under developing countries from the period 1962 to 1992. Variables like GDP deflator, primary exports, GDP growth and inflation were used in the study. The researchers concluded in the study that inflation shows a positive effect on GDP if it lies between the threshold limit of 10 percent to 20 percent. Mubarik (2005) studied the inflation- growth linkage for the country Pakistan by taking the annual data from the period 1973 to 2000. CPI, Population growth, investment rate and Real growth per capita income were the variables used by the researcher. The technique applied in this study was the threshold analysis method. The researcher concluded 9 percent as a definite inflation limit for Pakistan and explained that inflation shows an extremely negative effect on economic growth if it exceeds beyond that certain limit.

Munir and Mansur (2009) explored growth- inflation relationship for the country Malaysia. The researchers took the data from the era 1970 to 2005. The technique used by these researchers for their analysis was the Endogenous threshold Autoregressive model. The study used variables like FDI, Inflation, Real GDP growth and exports of goods and services as growth and inflation determinants variables. These researchers determined an unambiguous limit of 3.89 percent. They concluded in their study that inflation showed a positive effect below this limit and a negative effect beyond this limit. Omay and Kan (2010) inspected the association between inflation and economic growth. The researcher assembled the panel data of about 6 industrialized countries from the period 1972 to 2005. The researchers firstly applied the PSTR model on the data, concluded 2.52 percent as an exact inflation threshold level and narrated that if the inflation rate goes beyond this level it will provoke a negative impact on the economic growth. Later, the researchers applied the Seemingly Unrelated Regression Equations (SURE) method on the data and explained that the threshold level boosted from 2.42 percent to 3.18 percent correspondingly.

Abbott and Vita (2011) examined the interconnection between inflation and economic growth. The researchers used exchange rates of different periods. They collected the data from the period 1980 to 2004 of almost 125 developed and developing countries. Different variables like inflation, corruption, civil unrest, investment and fixed and intermediate exchange rates. The study concluded that fixed exchange rates help attain high growth whereas the supple exchange rates aggravate the low growth rate. Eggoh and Khan (2014) discussed the interconnection between inflation and economic growth. The researchers collected the data of the variables from the period of 1960 to 2009 of about 102 developed and under developing countries. PSTR and GMM were the two methods applied by the researchers on the data. The study concluded different threshold rates for different countries. For developed countries 3.4 percent, for developing countries, 19.5 percent, for worldwide 19.5 percent and average countries 10 percent threshold rate was determined by the researcher.

Tung and Thanh (2015) highlighted different appealing points of inflation – growth relationship. The researchers studied the data from the time era 1986 to 2013 for the country Vietnam. They applied the Two-stage least square (2-SLS) and the GMM methods on the variables like CPI, inflation, Terms of Trade, Trade openness population growth and different dummy variables. The study concluded a certain inflation rate of 7 percent for Vietnam and if the price hike surpasses that limits it will stimulate a negative effect on the GDP of the country. Obradovic et.al (2017) analyzed the bonding between the inflation – growth for Serbia by collecting the data from 2007 to 2014. Auto Regressive Distributed

Lag technique was employed on the data with variables like unemployment, inflation and the GDP. The researcher concluded that price stability is one of the most important determinants of growth; in the short run, inflation may rise and also indicates the existence of co-integration and unidirectional causality in the model in long run.

3. Data and Methodology

3.1 Data Sources

The study comprises different important macroeconomic variables that are closely affiliated with inflation and economic growth. The numerical data of these variables have been collected from different authorized sources. For the sake of precise and creditable research, the data set and the sources of variables must be correct and authentic. Only in this way the results and conclusions obtained from the research could be declared admirable. The present study collects the data with the help of secondary sources. The data of the variables have been collected from the sources like Economic Survey of Pakistan, World Development Indicators (WDI), Annual reports of the State Bank of Pakistan, Institute of Financial Survey (IFS) and Handbooks of Statistics. The data occupied from a secondary source is time series annual data of Pakistan on which the whole study is based. The data has been collected from the period 1980 to 2016. The reason for the selection of this period for research is that this is the most recent period and only a few researchers carried out their studies during this period for Pakistan. So this study is an attempt to fill the gap.

3.2 Constructions of Variables

Construction of variables constitutes of all those variables that are closely linked with inflation and economic growth. Gross Domestic Product (GDP) has been taken as the dependent variable as the impact of inflation is being observed on the GDP of the country. Moreover, Consumer Price Index, Trade openness, Literacy rate and Gross Capital Formation are incorporate as main and core independent variables. All these variables are explained one by one below in detail:

Gross Domestic Product (GDP)

Gross Domestic Product (GDP) can be explained as the value of all goods and services produced in an economy with help of all foreign and domestic resources within the boundaries of the country at a given period. It is mainly computed on an annual basis with the percentage change varying year to year.

Consumer Price Index (CPI)

Consumer Price Index is a procedure to measure the average value of a basket including goods and services for some specific period. The Consumer Price Index is used as a proxy variable to measure the inflation rate in the country. The Consumer Price Index can show both positive and negative effects on the price of commodities.

Trade Openness (TOP)

Trade openness can be explained as imports plus exports divided by GDP. It may also be known as the inward and outward point of reference. Theories also state that in open

economies trade openness shows a positive impact while with closed economies countries, it shows the negative effect with economic growth. According to theories, there exist a positive association between trade openness and economic growth. Usually, it is assumed that if the trade openness positively affects the country, the economic growth of that country raises and declines the inflation rate.

Literacy rate (LIT)

Literacy rate can be defined as the number of persons who possess the ability to read and write their basic language with a specific age limit of about 7 or greater. It is also believed that the country with a higher literacy rate leads to higher growth and it shows a positive relationship with higher economic growth.

Gross Capital Formation (GCF)

Gross Capital Formation is a macroeconomic concept used in official accounts at the national level. It can be measured by the total value of gross fixed capital formation. It is termed as the net increase in the physical assets during the measurement phase. It is assumed that Gross Capital Formation shows a positive effect on the growth and helps in increasing economic growth and reducing price hikes in the country.

3.3 Model Specification

In the present study, the model is specified in such a way that it includes both dependent GDP as well as an independent variable, i.e. consumer price index, trade openness, literacy rate and gross capital formation.

$$GDP = \beta_0 + \beta_1 (CPI) + \beta_2 (TOP) + \beta_3 (LIT) + \beta_4 (GCF) + \epsilon_t$$

$$GDP_t = \beta_0 + \sum_{j=1}^k \beta_1 j GDP_{t-j} + \sum_{j=1}^k \beta_2 j CPI_{t-j} + \sum_{j=1}^k \beta_3 j TOP_{t-j} + \sum_{j=1}^k \beta_4 j LIT_{t-j} + \epsilon_t$$

It is clearly shown in the above model that the GDP has been taken as a dependent variable because the impact of inflation is being observed on the GDP of the country. Moreover, consumer price index, trade openness, literacy rate and gross capital formation have been used as independent variables as they are the main and core variables of inflation and growth. β_0 is regarded as intercept whereas $\beta_{1,2,3,4}$ are regarded as slope coefficients in the model. ϵ_t is the error term in the model.

4. Estimation Analysis

This section involves the statistical and empirical analysis of the model discussed above. Statistical analysis is concerned with the descriptive analysis and the correlation matrix. Whereas the empirical analysis explains the application of Bound Test and Auto Regressive Distributed Lag approach on the model.

4.1 Statistical Analysis

Descriptive Analysis

In the descriptive analysis, mainly we observe the mean value and the Standard deviation of the variables. Moreover, Skewness and kurtosis are also the other two techniques that are helpful in this analysis for measuring the moment of distribution and the probability distribution. These two approaches are the main approaches used in any analysis for measurement.

First of all, we will explain the mean value of all variables along with their standard deviation values. The mean values of the variables consumer price index, gross domestic product, gross capital formation, trade openness and literacy rate are as follows: 4.883331, 8.067297, 17.76819, 0.932324 and 42.94865 respectively. Moreover, the standard deviation values for the variables like Trade openness, Consumer Price Index, Gross Domestic Product, Literacy rate and Gross Capital Formation, are as follows: 2.125459, 3.918616, 1.700322, 0.815615 and 12.11605.

Then, we will explain the Skewness and kurtosis values of the variables for analysis. If the skewness is zero, then the distribution will be symmetric. On the other hand, if the skewness is greater than zero then the distribution will be asymmetric. In the present study, Gross Domestic Product, Literacy rate and Gross Capital Formation show symmetric distribution. Trade Openness and Consumer Price Index show asymmetric distribution. Moreover, the variables like Consumer Price Index, Trade openness and Gross Domestic Product are positively skewed.

Table 1: Descriptive Analysis

Variables	Mean	Std. Deviation	Skewness	Kurtosis
GDP	4.883331	2.125459	0.221477	2.639988
CPI	8.067297	3.918616	1.237925	5.854980
TOP	0.932324	0.815615	1.035751	2.882612
LIT	42.94865	12.11605	-0.002029	1.482039
GCF	17.76819	1.700322	-0.554376	2.292761

Source: Author's calculations using E-views 9

Whereas the variables like Gross Capital Formation and Literacy rate are negatively skewed. Further, we will explain Kurtosis: There are two types of kurtosis: Lepto-kurtic and Plato-kurtic. In our analysis, the only Consumer price index is highly lepto-kurtic. Whereas the variables like Gross domestic product, Literacy, Trade Openness and Gross Capital Formation are platy-kurtic.

Table 2: Correlation Matrix of Variables

Variables	GDP	CPI	LIT	GCF	TOP
GDP	1				
CPI	-0.160659	1			
LIT	-0.451781	0.097954	1		
GCF	0.269444	0.280902	-0.660399	1	
TOP	0.619424	-0.090950	-0.897073	0.511165	1

Source: Author's calculations using E-views 9

The purpose of the correlation matrix is to explain the relationship among the variables.

The numerical values of the variables explain the strength of the relationship and the sign (+ and –) as well as the direction of the relationship among all the variables. The above table indicates the level of correlation among the variables of the model. The variable trade openness is strongly related to all of the variables. The Gross Domestic Product shows a negative relationship with the consumer price index, literacy rate and positive with trade openness and gross fixed capital. The consumer price index shows a positive relationship with literacy rate and gross fixed capital and a negative relationship with trade openness. The literacy rate shows a negative relationship with gross fixed capital and Trade Openness.

4.2 Empirical Analysis

Bounds Test

Abound test is applied to the analysis to check whether there existed co-integration and long run association in the model or not. If the f-statistics value of the bound test is lower than the upper and lower limits or bounds. This shows that there exists no long run relation or co-integration in the model.

Table 3: Bound Test

CRITICAL VALUE BOUNDS		
F-statistic = 5.590766		
Significance	I0 Bound	I1 Bound
10%	2.44	3.51
5%	2.85	4.00
1%	3.73	5.05

Source: Author's Calculations using E-views 9

The results of the bound testing fulfill the necessary condition that the value of the F- test must be greater than the upper. This explains that there is no existence of co-integration and also shows there an existent long run relationship among the dependent as well as independent variables. So, now the ARDL test can easily be applied to such a model.

Table 4: Short Run Estimates

SHORT RUN Estimates				
Variables	Coefficient	Std.Error	t-Statistic	Prob.
D(TOP)	-2.394299	3.242582	-0.738393	0.4664
D(LIT)	0.124054	0.070718	1.754202	0.0903*
D(GCF)	0.200110	0.280525	0.713340	0.4815
D(CPI)	-0.098907	0.086477	-1.143734	0.2624
CointEq(-1)	-0.871934	0.193580	-4.504270	0.0001*

Source: Author's Calculations using E-views 9

Note that *, **, *** demonstrates that parameters are significant at 1 percent, 5 percent and 10 percent level respectively.

One of the most important conditions is that its CointEq(-1) value must be between 0 and 1 and there must be a negative sign with the co-integration value. Our analysis is fulfilling the requirement as the CointEq(-1) value is -0.87 between 0 and 1 and there is a negative sign with the co-integration value with a significant probability value showing that our model is in its equilibrium. It has been clear from the above table that in the short run the

coefficient of the Consumer Price Index shows a negative effect on GDP and explains that one unit change in inflation will induce 0.09 unit decreases in GDP. Moreover, the t – statistics value of the Consumer Price Index is also significant. As a whole, in short run period, Consumer Price Index indicates the negative and insignificant effect on the GDP. The coefficient of Trade openness indicates negative relation with GDP. One unit change in Trade openness will decrease 2.39 units in GDP. Its t – statistic value is also below two, so it is statistically significant. The overall Trade openness shows a negative and insignificant effect in the short run period. The coefficient of Gross Capital Formation shows a positive relationship with GDP. It indicates that one unit change in Gross Capital Formation will cause 0.20 units to increase in GDP. The results of Gross Capital Formation show that it has a positive effect on GDP but it is statistically insignificant. Moreover, the coefficient of Literacy rate also shows positive bonding with GDP and one unit change in Literacy rate will induce 0.12 unit increases in GDP. But the Literacy rate has been statistically insignificant as its value is less than two.

Thus it is clear from the above results that in the short run period all variables are statistically insignificant. Half of the variables shows positive and the remaining one shows a negative relationship with GDP. These short run results also help us making a mechanism regarding the fluctuations in time series data of any variable. Consumer Price Index has a negative impact on GDP. While the variables such as Trade Openness, Literacy rate and Gross Capital Formation shows a positive relationship with GDP. The coefficient of the Consumer Price Index shows that it has negative bonding with GDP and it is statistically significant. One unit change in Consumer Price Index will induce 0.23 units to decrease in GDP. The coefficient of Trade Openness also indicates that it has a positive relationship with GDP and it is statistically significant. One unit change in Trade Openness will indicate 2.55 units increase in GDP.

Table 5: Long Run Estimates

LONG RUN Estimates				
Variables	Coefficient	Std. Error	t- Statistics	Prob.
TOP	2.552650	0.919400	2.776429	0.0097*
LIT	0.142274	0.070109	2.029321	0.0520**
GCF	0.229501	0.297772	0.770726	0.4473
CPI	-0.236400	0.102026	-2.317055	0.0280*
C	-6.261815	7.607718	-0.823087	0.4174

Source: Author's Calculations using E-views 9

Note that *, **, *** demonstrates that parameters are significant at 1 percent, 5 percent and 10 percent level respectively.

The coefficient of Literacy rate also shows that it has a positive relationship with GDP and it is statistically significant. The coefficient of Gross Capital Formation shows that it has a positive relationship with GDP and a one unit change in Gross Capital Formation will bring on a 0.22 units increase in the GDP. A probability value of gross capital formation is statistically insignificant.

We observed in the analysis that the Consumer Price Index has a negative linkage with GDP. This is due to the reason that as inflation increases the prices of different goods and commodities also increase leading to a decrease in the purchasing power of the consumer. Now the consumer has less to save and invest results in a decline in GDP Malla (1997).

Trade openness has a positive relationship with GDP. It plays an important role in the economy. If the production of some goods requires an adequate amount, it would be disadvantageous for the economy. But in the presence of trade opportunity, these goods can be imported from the countries where it is less expensive. Hence, in this way, it shows a positive effect on GDP. The literacy rate shows a positive association with GDP. This is because that as the number of literate persons rises in the country; the economy grows as educated persons create new paths of success De Gregorio, J. (1992). The Gross Capital Formation shows a positive relationship with GDP. But it is statistically significant for the country this is because of the reason that Gross capital formation is not being contributed to the country's economy Onyinye (2017).

4.3 Diagnostic Test

Diagnostic tests are applied to eradicate out the problems of autocorrelation and heteroskedasticity in the model. To check the problem of autocorrelation in the model, the Breusch – Godfrey serial correlation LM test is applied and for the detection of problem heteroskedasticity in the model, the WHITE test is applied.

Table 6: Diagnostic Tests

Serial correlation	Breusch- Godfrey Serial Correlation LM Test	F–Statistics: 0.189954	Probability: 0.8281
Heteroskedasticity	WHITE Test	F–Statistics: 1.161737	Probability: 0.6399

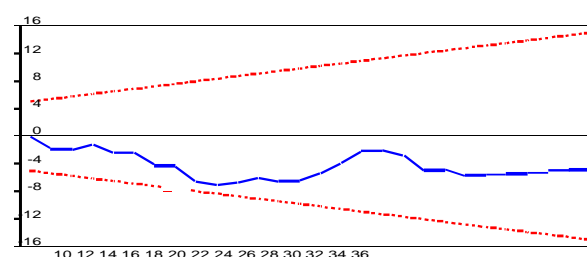
Source: Author's Calculations using E-views 9

It is clear from the above table 6, that there is no problem of autocorrelation, as well as heteroskedasticity in the model as the probability value of both tests, are 0.8281 and 0.6399 respectively. These values are far greater than the 0.05 showing the effectiveness of the model.

4.4 Stability Test

In the ARDL method, the stability of the model can be estimated with the help of the CUSUM test. The stability tests are used to check that at what extent the model is stable. The coefficient of estimated models is said to be stable if the CUSUM graph falls within the limits of critical bounds at the significance level of 5%. This figure shows that overall the estimators are stable.

Figure 1: CUSUM TEST



5. Conclusion and Policy Recommendations

The overall study discussed in preceding sections indicates that inflation shows a very

important as well as a significant impact on GDP. Inflation has a very wide effect on the other different sectors of the economy as well.

The results indicate that the Consumer price index has a negative as well as a significant impact on Gross Domestic Product, because with the increase in prices of goods and services the purchasing power of the consumers declined to lead to a decline in GDP. The Gross Capital Formation also has a positive and insignificant relationship with Gross Domestic Product due to its non-contribution toward the economy. The Literacy rate has a positive impact on the gross domestic product because as the number of literate people rises in a country they make new paths in the progress and prosperity of the country, thus the GDP of that country also increases. Trade openness has a positive and significant impact on the GDP.

Following are some policies and recommendations in controlling inflation:

- By effectively controlling the monetary policy, inflation can be reduced to much extent.
- By keeping the check and balance on the prices of goods and commodities in the market can much help reduce inflation.
- Providing subsidies by the government of Pakistan on daily based necessities may also play an effective role in controlling the inflation rate
- By adopting Fiscal policy along with monetary policy can also help in decreasing inflation in the country.
- By encouraging the public to increase their savings can also play its role in eradicating inflation from the country.
- By adopting the anti-inflationary budgetary-policy, inflation can be reduced to a large extent.
- By increasing the production of daily based necessities like food, clothing, petroleum products and manufacturing products the inflation can be condensed.
- By adopting the policy of rationalization of industries, inflation could be decreased.

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